HR001120S0027
Wideband Adaptive RF Protection (WARP)
Frequently Asked Questions (FAQ)
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Q1: Does DARPA intend to have multiple awards?

A1: Yes.

Q2: How much funding is available?

A2: As stated in the BAA, approximately $20M per TA is expected to be made available, for a total of $40M.

Q3: Can my organization respond to both TAs and if so, how?

A3: Yes, as stated in the BAA, proposers who wish to propose to more than one Technical Area must submit a separate full proposal for each individual Technical Areas.

Q4: Does DARPA intend to down select the performers at each program phase and what will be the evaluation criteria?

A4: Per the BAA, DARPA plans to exercise options in Phases 2 and 3 of the program based on technical progress demonstrated against the metrics and based on funding availability.

Q5: What are the size and weight requirements for WARP?

A5: There is not a hard numerical metric for the size and weight. The BAA states on page 8 and 11 "consistent with current integrated microwave assembly packaging."

Q6: We understand multiple awards are expected for the WARP program. What would be the anticipated individual funding size for a 3-phase 48 month effort for the WARP development?

A6: Proposers should price their proposals to be consistent and realistic with the scope of the work proposed.

Q7: Will there be a future need for WARP frequency range to be extended to 40 GHz, i.e. 2-40 GHz?

A7: Abstracts and proposal will be reviewed against the metrics in the BAA. Exceeding the metrics to demonstrate performance to 40 GHz is within the scope of the WARP BAA.

Q8: What is the maximum DC supply voltage allowed/available for WARP operation?

A8: DC supply voltage is not a metric, only power consumption.

Q9: For the TA1, given the bandwidth tuning ratio >5:1, what is the minimum passband bandwidth?

A9: The absolute bandwidth is not defined and is left up to the performer. The achievable bandwidth is expected to be a function of the chosen resonator quality factor, filter order, and overall filter architecture. The insertion loss metric and tuning ratio should guide the proposed design to propose the best filter possible.

Q10: For TA1, given bandwidth tuning ratio >5:1, does variable bandwidth have to be continuous? If it does, what is the minimum bandwidth resolution for 5:1 variable bandwidth ratio?

A10: No, page 8 of the BAA states "The filters can be either continuously or digitally tunable, in both center frequency and bandwidth, as long as they fully cover the entire frequency range specified in the metrics."

Q11: TA1, given bandwidth tuning ratio >5:1, can variable bandwidth be incremental? If it can, what is the minimum step?

A11: Yes it can be incremental, the step size is a free parameter, and the insertion loss, tuning range metrics and gap-free coverage should guide the trade-off analysis in choosing step-size.

Q12: For TA1, given a center frequency tuning ratio >3:1 (Phase 2) and Full Band Solution (Phase 3), what is the minimum center frequency tuning resolution?

A12: TA1 Metrics, Table 1 Note 3, indicates "…no gaps over the tuning range."

Q13: Does the government anticipate that any CUI will be developed during this effort?

A13: A CUI Guide has been published as Attachment 3 to the BAA. Proposers should review in order to understand any aspects of the program that may generate controlled unclassified information.

Q14: Is foreign participation allowable either through collaboration or direct response?

A14: Per the BAA, all responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances

Q15: Is "non-orthogonal multiple access" (NOMA) within scope for WARP?

A15: NOMA typically uses a mix of amplitude, code sequence, beam pattern or angle of arrival to separate cooperative signals for multi-user access. Per the BAA, TA1 is about external (non-cooperative) interference and TA2 is about self-interference from your own transmitter. While work in both TAs may sense amplitude and/or frequency, WARP is not about multi-user access of cooperative signals, and therefore NOMA is not within scope for the program.

Q16: How would the "adaptive sensing" requirement in the BAA be different from (or similar to) the scenario "cognitive radio" in the literature?

A16: Cognitive radio may mean different things to different people, but the BAA makes it clear that the filtering or cancellation developed in WARP will leverage embedded sensing and adaptive control, independent of downstream software-defined radio processing.

Q17: Can you elaborate on the Embedded Entrepreneur Initiative?

A17: This initiative is intended to help small businesses or startups get over the hump of transitioning their technologies into DoD applications. See pages 24-25 of the BAA.

Q18: How do you envision TA1 automatic tuning for bandpass function?

A18: DARPA expects that the details of the automatic tuning approaches will be provided by the proposers.

Q19: For TA2, can we incorporate digital circuitry into the analog canceller?

A19: Yes, the details depend on the proposed approach. However, the proposers should be mindful of the program power consumption goals.

Q20: For TA1, please explain the sensing part. Are you expecting a lookup table for a sensing chip that can sense the RF signal and feed it into our controller?

A20: The sensor could be a chip or a PCB circuit or built into the filter. The exact approach is left to the performer to propose.

Q21: For TA2, do we choose any center frequency in 0.1 GHz - 1 GHz band with required bandwidth for phase 1 and 2 continuous band coverage?

A21: Yes, as long as the proposed choice is clearly described and justified in the proposal. Also, it is expected that a scaling approach will be provided that charts a credible path to meeting or exceeding the program metrics stated in the BAA.

Q22: For TA2, will the self-interference cancellation (SIC) filter need to be 50 Ω?

A22: The input port from the transmitter is expected to be from a 50 Ω source, but there is no metric on the return loss of your proposed solution. The port that will be plugged into the antenna is expected to be a 50 Ω port as an industry standard, but there is no metric on return loss. The implementation details of these ports are left to the proposers, however the proposers are expected to clearly describe and justify their implementation approach.

Q23: For TA1, do we need to design LNA tunable from 2 GHz to 18 GHz? Can we use COTS?

A23: The WARP program is not about LNAs. LNAs are assumed to be part of the digital receiver. However, proposers might propose building LNAs into the tunable filter, which would be acceptable, as long as the proposed approach is credible and can meet the program metrics.

Q24: For TA2: (a) Is 100 µs for the closed-loop adaptation for the entire band? (b) What are the components on-chip (e.g., PLL, VCO, etc.)?

A24: (a) It is expected that the transmitter will be transmitting in one band at any given time, and that this band will be known. (b) It is expected that the proposers will provide the implementation details of their proposed solutions.

Q25: For TA2, what is the antenna isolation assumption?

A25: No specific antenna isolation metric is assumed or explicitly stated, but rather a cancellation metric is provided.

Q26: Will DARPA provide tapeouts including FDSOI or FINFET?

A26: No. Proposers are expected to propose any silicon tapeout cost in the cost proposals.

Q27: Can we assume some of IM3 can be cancelled digitally (~20 dB)?

A27: Digital cancellation, while technically feasible, is not expected to be part of the WARP program. See Section I.D Technical Area 2, bottom of page 11.

Q28: Does TA2 also consider external interference?

A28: No. However, the proposed TA2 approaches are expected to be adaptive to antenna impedance variations due to changes in environmental conditions (e.g., movement of aircraft wings, people walking in front of antennas, etc.).

Q29: For digital tuning of the canceller for TA2, would data converters be part of the DC power budget?

A29: Yes. However, closed loop control circuitry (like FPGA, microcontroller, etc.) may be left out of the power budget, per the BAA.

Q30: Is the 250 mW DC power metric a go/no-go metric?

A30: The WARP program does not have strict go/no-go metrics and proposed solutions will be evaluated in their entirety.

Q31: Can an organization submit multiple abstracts to same TA?

A31: Yes.

Q32: Are you interested in RF silicon photonics filter solutions along with embedded integrated electronics for TA1?

A32: Any solution that achieves the program goals, objectives, and metrics will be considered. For any photonics solution, the prime power consumption of the required laser(s) would have be included in the power budget.

Q33: For TA1, how many notches do we expect to achieve? Or, does the solution need to be scalable to arbitrary number of notches?

A33: This has not been explicitly specified. Creative solutions are desired. Proposers are encouraged to consider insertion loss and tuning metrics for guidance.

Q34: What do you envision the role of CMOS to be, especially in TA1?

A34: CMOS is an acceptable tool, but DARPA will not provide specific guidance on how solutions should be implemented.

Q35: Would you accept tunable active frequency selective surface designs for filtering (TA1) and cancellation (TA2)?

A35: Guidance on specific solutions will not be provided, but techniques to improve antenna isolation are beyond the scope of WARP, per the BAA.

Q36: Will any technology solution be considered for TA2 canceller (e.g., III-V technology, photonics, digitally assisted, etc.)?

A36: The BAA is technology agnostic, so any solution that can credibly meet the program goals, objectives, and metrics will be considered.

Q37: What is the best way for a Government agency to submit a proposal? On our own? Teaming with a company/contractor? What about non-competing requirements?

A37: Refer to the Section III, "Eligibility Information," of the BAA.

Q38: Regarding the cancellation metrics in TA2, does the cancellation number only account for self-interference directly between transmit and receive antennas?

A38: The proposed solution should address all self-interference propagating from the transmitter to the receiver and may include reflections, multi-path, etc.

Q39: Filters and cancellers could be greatly influenced by source impedance. I assume that part of the adapting function comes into play here. What is a reasonable antenna impedance range?

A39: Yes, this is a part of the adaptation challenge. Proposals should specify and address reasonable antenna impedance variation expected in realistic operational environments.

Q40: For TA1, is bandwidth tuning required or advantageous (not frequency tuning)?

A40: See the TA 1 metrics listed in the BAA.

Q41: Calculation of residual noise figure impact as described in Table 2, Note 10 requires knowledge of original system noise figure. Can you please clarify?

A41: See TA2 metrics listed in Table 2 of the BAA, specifically Note 10.

Q42: Do you have a preferred abstract and submission format that you can share?

A42: Follow the guidance in the BAA, starting on page 19.